

powder with a residue. There being nine intervals in the ten rounds, one minute and three seconds would have been saved had smokeless powder been used, or the ten shots would have been fired in one minute and fifty-three seconds, which is as good if not better than the record of any foreign 6-inch gun with projectile of 100 pounds weight." At the time of these tests a test was also made of a gun fitted with the slow-fire mechanism, the conditions of firing being precisely similar for each gun. The gun with the ordinary slow-fire service mechanism took five minutes and two seconds for the ten rounds.

These experiments are of great interest in that they show that the ordinary delivery of a 6-inch gun was more than doubled by application of quick-acting mechanism, even without the use of smokeless powder, and that this result was obtained as far back as 1892. In 1897, five years later, the Vickers Sons & Maxim Company, of England, produced a gun on the same principle—a quick-acting mechanism with the De Bange gas check and no cartridge cases—with which gun they obtained a rate of fire of from seven to eight rounds per minute. This shows that so far from our Naval Ordnance Bureau being behind in the development of rapid-fire ordnance, it was, so far as the principle is concerned, five years ahead of what may be considered the highest development of the 6-inch gun in Europe. As the Vickers gun uses smokeless powder, the results obtained were considerably ahead of those which we achieved at our proving ground in 1892, for the reasons which we have already quoted from the report of that year.

The good work of Lieut. Dashiell has been supplemented by the excellent designs of later date by Lieut. F. F. Fletcher, whose rapid-fire mechanism is illustrated on pages 13 and 15 of the Coast Defence number of the SCIENTIFIC AMERICAN SUPPLEMENT. In this mechanism the breech is unlocked, withdrawn, and traversed clear of the breech by a single sweep of the lever acting on a very compact worm and rack device. To the same gentleman the navy is indebted for the quick-acting breech mechanism applied to its heavy 12 and 13-inch guns. This is a modification of a worm and rack device invented by a Frenchman named Farcot in 1880. His invention was not successful, as it could never be operated by hand power, and it was the modification introduced by Fletcher that made it a success. With this device the 13-inch breech has been opened in 8 1/4 seconds, and the time between rounds has been reduced to 1 minute and 47 seconds.

In connection with Dashiell's early experiments with a 6-inch rapid fire mechanism, it is interesting to note that our government has lately purchased the rights to use and manufacture the Vickers breech mechanism for \$200,000. With this improvement and the use of smokeless powder added, our rapid-fire guns will stand in the very front rank for speed and efficiency.

In regard to the ammunition supply, there is no question but what the United States navy ranks ahead of any other navy in the world in the success obtained in delivering ammunition to the battery, at least so far as the rapid-fire guns are concerned. There is, of course, much yet to be desired in the delivery of ammunition in turrets, but the recent invention of Lieut.

Haeseler, U. S. N., and its application to the "Texas" has shown what can be done in this line; for the delivery of ammunition to the "Texas" guns has been increased about six times by the adoption of plans prepared by this officer. The delivery of rapid-fire ammunition to all calibers of rapid-fire guns out of turrets has been developed along the lines tending to simplicity and immunity from disaster from the enemy's fire, and it has now reached such a stage that ammunition can be delivered at the gun as rapidly as the gun can fire it. As a matter of fact, the ammunition supply may be said to be excessive, because the maximum rapidity of aimed gun fire is attained only in volleys for intervals of not greater than three minutes at a time; whereas the ammunition hoist runs steadily as long as it is fed from the bottom.

All the hoists are of the endless chain pattern shown in the accompanying illustrations of the hoists to the 4-inch rapid-fire guns on the monitor "Puritan." The hoists consist principally of a trunk (see Figs. 2 and 3), about 18 inches square for 6-inch ammunition and less for the smaller calibers, in which runs a pair of sprocket chains with cross bars between them at intervals. The arrangement is practically an endless ladder with rungs about seven feet apart. The bottom of the trunk opens into the magazine, and the chains travel over sprockets at the bottom of the hoist and at the top just below the deck. The chains are driven by an electric motor through a worm and worm-wheel. The ascending half of the hoist passes in front of the magazine door, and here the men in the magazine take the cartridges from the racks and place them, one at a time, on the rungs or steps, by which they are carried up to the gun. The speed of the chains varies from one to two feet per second, and the delivery of the charges is from six to eight per minute for the larger rapid-fire guns. In the 6-pounder hoists of the "Indiana," boxes containing eleven rounds of ammunition have been delivered at the rate of seventeen boxes per minute. The trunks are made of such a width that they can be traversed by a shot, and, unless the chain itself be cut, the burrs thrown up by such a shot will not interfere with the passage of the round of ammunition. The upper end of the hoist is made flush with the deck and is closed with a flush scuttle plate, thus making no obstruction whatever on the deck above. The trunk is also closed with a watertight door in the magazine (see Fig. 4). A number of pawls (A, A, Fig. 2) distributed along the central guide plate in the trunk prevent the ammunition from falling in case the chain be shot away.

So effective is the system that, by a judicious arrangement of ammunition hoists throughout a ship, her whole ammunition can be delivered on deck in thirty minutes. It is needless to say that the battery could not deliver it at the enemy in thirty minutes, as no gun could stand the ordeal of continued firing for this period.

The accompanying table shows the relative number of 4, 5, and 6-inch rapid and slow-fire guns on the ships that are built or approaching completion in our navy.

The table shows we have a total of 318 rapid-fire guns against 68 of the slow-fire type. The 6-inch slow-firers are to be found on gunboats, such as the "Yorktown,"

	Rapid-fire.			Slow-fire.
	6-inch.	5-inch.	4-inch.	6-inch.
Battleships.....	50	28	6	.....
Monitors.....	.....	.....	10	.....
Armored cruisers.....	.....	12	12	.....
Unarmored cruisers.....	18	74	16	46
Gunboats.....	.....	.....	82	22
	78	114	128	68

and cruisers, such as the "Philadelphia" and "Baltimore," that were built before the era of heavy rapid-fire weapon, and have some of them been continuously in commission for several years. The policy of the department is to replace these weapons with rapid-firers the first time that the exigencies of the service permits the ships to return to the navy yards. The 6-inch slow-firers on the "Texas" and on the three battleships of the "Indiana" type are now being replaced with rapid-firers, and it is probable that within the next twelve months the last slow-fire gun will have disappeared from the United States Navy.

The Current Supplement.

The current SUPPLEMENT, 1186, contains a number of papers of remarkable interest. "The Congo Railroad" is an illustrated article accompanied by a map which gives a detailed account of this great engineering work in the heart of Africa. "High Explosives and Smokeless Powder," by Hudson Maxim, is a very important paper by the great explosive expert. It is a paper which will be read with interest by all who are in any way interested in the ordnance of both the army and navy. The attention of our readers is called to the short notes which are given each week and which are also scattered through the paper. In the present number there are twenty-seven notes on a large variety of subjects. "Bull Fighting" is an article illustrated by engravings made from actual photographs in the bull-fighting ring. "Drinking Water at Camp Thomas" is a report of a sanitary engineer on the condition of Camp Thomas, Chickamauga, Ga. "The Significance of the Garment," by Alice C. Fletcher, is a paper read before the last meeting of the Association for the Advancement of Science. "Liquid Air" is a lecture delivered by Prof. G. F. Barker, of the University of Pennsylvania. This lecture has been revised by the author. The first installment is published in this week's issue of the SUPPLEMENT.

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RECENTLY PATENTED INVENTIONS.

Mechanical Devices.

**MOTOR CARRIAGE.**—VICTOR ETIENNE PRETOT, Paris, France, has patented a motor carriage which he calls a fore-carriage. It is designed to be used in connection with any ordinary carriage in the same manner as horses. It consists of a very compact motor, operated by petroleum, and connected with the axle by an ingenious arrangement of differential gearing by which any desired speed and power may be applied. The mechanism for stopping, starting, and backing is simple and convenient.

**TREAD-SANDING MACHINE.**—GEORGE A. ENGLISH, DeLancey, O. This invention relates to machines for truing and smoothing the treads of wooden vehicle wheels, and it is the object to provide a simple and durable machine for this purpose, which will enable the operator to perfectly smooth the tread of a wheel and render its peripheral surface square to the plane of the wheel. It consists principally of oppositely arranged abrading surfaces between which the tread to be acted upon is adapted to pass, and a revoluble standard for supporting and carrying the vehicle wheel and holding it between the two abrading surfaces.

**JACK.**—JOHN S. SCHLOSSER, Wadsworth, Ill. This jack is simple and durable in construction, easily applied, and conveniently manipulated. It is more especially designed for raising the felly from the spoke of the wheel to permit the insertion of a washer on the tenon of the spoke to insure a firm joint and to prevent the wheel from rattling. It is provided with a support adapted to be clamped to the spoke of the wheel. The support comprises a U-shaped member formed with sets of steps, the clamping member having a cam surface and pivot pins for engaging the steps. The jack is so simple in construction that it is not liable to get out of order and can be readily applied to any sized wheel for the purpose mentioned.

**HAND DRILL.**—JAMES MCSWEENT, Pittsfield, Mass. This invention is an appliance for regulating the feed of drilling apparatus, and is designed especially for hand drills. The drill spindle is threaded and carries a nut provided with a head by which the nut may be manually turned to hand feed the drill. Supported rigidly on the

framing of the drill is a clamping device, by which the nut may be rendered fast with the frame, and, consequently, stationary with reference to the drill spindle. Then, as the spindle turns, the drill is fed with mechanical regularity by the action of the nut on the threads of the spindle. The several parts have such peculiar construction and are so combined that the device may be manipulated with ease and certainty.

**VEHICLE-WHEEL.**—JOSEPH BLAIS, Sherbrooke, Can. This invention relates to a vehicle-wheel, and has for its object means for tightening the tires on the rims of wheels. For this purpose a wheel with a double set of converging spokes is employed, by a novel mechanism. The inner ends of the spokes are moved toward and from each other, thereby increasing the diameter of the wheel at the rim.

**AUTOMATIC FIRE-EXTINGUISHER FOR PASSENGER COACHES.**—MARLON MONROE WILLIAMS, Rico, Col. This invention provides a new fire extinguishing apparatus especially designed for use on passenger coaches. It is so arranged as to automatically extinguish the fire in the heaters, blow out the light in the lamps, or shut off the gas in the gas burners in case of a wreck or other accident, in order to prevent the coach from being set on fire. It includes a reservoir for compressed air for use in blowing out the lights and for forcing water into the fire boxes of the heaters, or shuts off the gas supply in case gas is used for illuminating purposes. Various means are provided for the automatic operation of the device in an emergency.

**MACHINE FOR MANUFACTURING WELDLESS CHAINS.**—JOSEPH MAYERS DAVIS, Glasgow, Scotland. This invention relates to a machine for the manufacture of weldless chains having open or unstayed links, with or without thickened ends, from a bar of cruciform section by a consecutive series of cold punchings and other operations. The bar of cruciform section is transferred into a series of unchained unstayed links, by being passed once through a machine actuating three sets of punches arranged to act at consecutive points. After the punching operation, which constitutes the initial stage of the manufacture, means are provided for bringing the links to a round section by stamping between dies and being compressed laterally to the desired form and dimensions.

**ROCK-BREAKER AND ORE-CRUSHER.**—FRANCIS H. COOK, Spokane, Wash. This new rock-breaker belongs to the class of machines for crushing ores in which an oscillating jaw is arranged opposite to the fixed jaw, the same forming two sides of a hopper. The movable jaw is actuated by an eccentric shaft. Adjustable crushing rolls are also provided to reduce the rock ore to a fine state of division. The simplicity of the construction permits of a ready examination and cleaning of the parts.

**APPARATUS FOR MIXING TEA.**—In the old form of machine for this purpose, it has been usual to discharge the contents of the mixer through the charging aperture in the side of the drum into a receptacle below. To cause the contents to run out entirely, the drum is turned backward and forward several times to completely empty it. Mr. C. H. BARTLETT, Bristol, England, has patented a mixer in which these difficulties are avoided, and in which the teas are more thoroughly mixed. The mixing drum has a central discharge aperture and a chute connected therewith. After the mixing is done, the mixed tea is carried upward by the rotation of the drum and discharged upon the chute, through which it flows out of the machine.

Railway Appliances.

**CONDENSING LOCOMOTIVE.**—Two patents have been recently issued to THOMAS J. MURRAY, of Butte, Mont., for a compound locomotive, which condenses the exhaust steam, heats the feed water, and in which the fuel is kept dry. This locomotive is capable of making a very long run, owing to the economy gained in both water and fuel. The entire locomotive is housed to prevent waste of heat and to protect it against snow, rain, and dust. The parts of the main frame which slide one upon the other are provided with ball bearings. The forward truck carries the cylinders. The boiler has a closed fire box, and the air for supporting the fire after being heated is drawn through the burning fuel by an exhaust fan in the smoke box. The exhaust steam is delivered to a surface condenser in which it is condensed and returned to the water tanks. The feed water is heated to a very high temperature and admitted to the boiler by gravity after the pressure in the heater has been equalized by the admission of steam from the

boiler. The engine has many novel features, which need to be explained at length to be clearly understood.

**NUT-LOCK.**—JOHN R. HORN, Camden, Ark. This spring nut-lock device is intended to automatically take up the slack caused by wear of the angle or fish plates and bolts and at the same time positively lock the nut and absolutely prevent backward rotation of the nut when in use, while at the same time it can be easily applied and removed. The device consists of a steel bar or rod, having approximately the form of the numeral 8, with its ends both free and bent outward from the plane of the body portion of such device, one of the ends being beveled on its inner side.

Agricultural.

**VINE-TRIMMER.**—GEORGE NORMAN JEUNE, Deer Wood, Minn. This new vine-trimmer is a machine especially designed for conveniently trimming strawberry or other vines or plants running close to the ground. It is arranged in a very simple manner to permit the user to conveniently move it over a field to cut up rooted as well as exposed vines. It comprises a shear or blade having a beveled, chiseled edge on the inclined forward end. The revoluble cutter is secured on one face of the shear or blade, and is operated in conjunction with the cutting edge at the top of the blade. Motion is transmitted to it from a wheel which is adapted to travel on the ground. The chiseled edge cuts the rooted vines, while the other vines are cut by the revolving cutter.

Miscellaneous.

**MUTE CLAVIER.**—LOUIS ILLMER, Jr., Washington, D. C. This invention is an improvement in mute clavier for piano practice for use in studying the piano. It consists of an exercising apparatus provided with keys and with a rocking sounding device having a detent which moves into engagement with the key when the latter is depressed. Means are provided whereby if one key is depressed too far before the previously depressed key is released, the first key will be held by a detent, and if a key is depressed, and then released before a second key is depressed, the action will, as the first key moves upward, strike a bell and indicate to the

pupil his mistake. Therefore, the instrument indicates positively to the pupil whether the second key is depressed too fast or too slow with respect to the release of the first key, and enables the pupil to determine with accuracy whether the touch is properly cultivated.

ACCOUNT KEEPING BOOK.—THOMAS G. KNIGHT, New York City. This invention provides a new and improved account-keeping book designed for use as a collection account book and the like to enable the book-keeper to see at a glance the standing of a customer. It consists of an account-keeping book provided with a plurality of leaves ruled for forming an account of a given period and divided into a column for names of the customers and successive equal monthly divisions, subdivided for keeping account of the new business for the month, the total balance, and for remarks, each leaf being provided with transverse perforations to permit a portion of it to be torn out and with apertures at each end and with fasteners for attaching the removed portion to another page.

TABLE AND DRAPERY-HOLDER.—ROBERT S. GANOUNG, Seneca Falls, N. Y. This invention relates particularly to devices adapted for connection with a table for supporting a canopy of drapery over the same, while the table is supporting a burial casket, and the object is to provide a device of this character which may be easily adjustable to height and also to so construct it that its several parts are detachable, so that the whole device, with the table legs, may be packed in the table top. In brief, the invention consists in a table adapted to support a burial casket, of a sleeve attached to the back rail of the table adapted to receive an adjustable rod, the rod being flattened on one side to engage a flattened portion of the sleeve. A standard is adjustable vertically with relation to the sleeve, and consists of telescopic sections and a bracket on the upper section of the standard. The apparatus may be adjusted to any height.

FIREPROOF PARTITION.—FRANCIS OMEIS, of Charleston, S. C., has secured a patent for a novel fireproof partition or wall, in which the studding or beams are formed of two metal plates curved and united to each other by rivets joining the central portion of the convex sides. When this beam is used as studding, it is secured at the top and bottom by angle plates. When a solid partition is built, wires extend through holes in the central part of the studding. Upon these wires are secured plaster-supporting webs of woven wire, or stamped sheet metal, and to this skeleton wall is applied plaster, which is built out until it covers the edges of the studding. When a thick, hollow wall is to be built, the wires are secured to the edges of the studding and a plaster support and plaster is applied in the same way as in the case of a lathed wall.

GRAIN-SEPARATING MACHINE.—C. E. CULVER, Cashion, Wis. By means of this machine, oats and other light seed and dust are separated from wheat rapidly and thoroughly, and the different kinds of seeds and the dust are discharged separately. The grain is delivered to a revolving drum having small pockets in its interior. As the drum slowly revolves, the grain is packed into the pockets by flexible strips, and a rotary brush brushes back the oats and dust. The grain in the pockets is carried upward by the cylinder, and the lighter materials, owing to the inclination of the cylinder, is made to discharge at the front while the grain is deposited on an inclined table down which it rolls. The small particles and seeds and the broken grain pass through perforations in the table and are delivered to one conveyer, while the grains of wheat are delivered to another conveyer.

DRY-KILN.—J. GUERRERO and J. UNGEMACH, Buenos Ayres, Argentina, have patented a dry-kiln, for quickly and thoroughly drying various substances. It is provided with inner and outer walls, and a furnace of novel construction for supplying the necessary heat. It has also an efficient system of ventilation by which the moisture expelled from the articles being dried is carried away. This drier can be used for many different purposes, but it is especially designed for the preparation of hung beef.

Designs.

CARTON FILLER.—ROBERT J. BARKLEY, Chanute, Kans. The design consists in a filler presenting the appearance of a series of panels equally spaced from each other. The panels extend transversely of two longitudinal members which are disposed in proximity to each other and extend across the central portions of the first-mentioned panels, whereby narrow elongated openings appear between the members extending lengthwise between the adjacent panels.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for 10 cents each. Please send the name of the patentee, title of the invention, and date of this paper.

NEW BOOKS, ETC.

A POCKET BOOK FOR MECHANICAL ENGINEERS. By David Allan Dow. With over 1000 illustrations. London, Bombay and New York: Longmans, Green & Company. 1898. Pp. 740. Price \$2.50.

We learn from the preface that the preparation of the work has occupied the whole of the author's spare time during the past five years, and that he has also had the services of several assistants in the calculation of the tables and in the preparation of their illustrations, and we judge, from a cursory examination of the book, that the time has been well spent. It is a mine of valuable information presented in a terse form, easily understood by engineers. There are already a large number of engineers' pocket books, but there always seems to be room for one more, as engineering practice moves so rapidly. We could not undertake to give an outline of the contents in the limited space at our disposal, but, in brief, it may be stated, it includes mathematics, calculations and civil and mechanical engineering, with special attention to steam, pneumatic, and hydraulic engineering. The book is beautifully printed and the type is astonishingly clear. Illustrations are freely scattered through the book.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

Marine Iron Works. Chicago. Catalogue free. For logging engines. J. S. Mundy, Newark, N. J. "U. S." Metal Polish. Indianapolis. Samples free. Gasoline Brazing Forge, Turner Brass Works, Chicago. Yankee Notions. Waterbury Button Co., Waterbury, Ct. Handle & Spoke Mch. Ober Lathe Co., Chagrin Falls, O. FERRACUTE Machine Co., Bridgeton, N. J. Full line of Presses, Dies and other Sheet Metal Machinery. Inventions developed and perfected. Designing and machine work. Garvin Machine Co., 141 Varick St., N. Y. The celebrated "Hornby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

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To Manufacturers.—Owning lands and buildings which are admirably adapted to manufacturing purposes situated in the great coal, iron, and timber belt of the Central South. I desire immediate correspondence with parties owning machinery, especially wood working machinery, who contemplate removing their business South. I am prepared to offer favorable opportunities to such. I also wish correspondence with those desiring to procure valuable iron land in the same section. Address Lock Box 204, Jonesboro, Tenn.

WHAT TO SEE IN THE MOUNTAINS ON THE LOW RATES.

That the mountain regions of northern New Hampshire are famous is evidenced by the thousands of visitors who annually seek the section for a season of recreation and rest. It matters not to what portion of the mountain region you go, for you will never be dissatisfied, as the variety and extent of scenic attractions is unlimited and your expectations, no matter how ambitious, are more than fulfilled. Several hundred square miles of mountain peaks comprise the White Mountain region, and of the scores of resorts located in its midst space permits mention of but a few of the largest.

Many consider the vicinity of Dixville Notch the most beautiful part of the White Hills. The view of the surrounding territory is very beautiful, for lakes, mountains, brooks, and ravines are everywhere around, making an interesting landscape. In the Franconia region one finds many odd though beautiful attractions. There the Old Man of the Mountain stands guard over a galaxy of wild though particularly impressive bits of nature work. There is Cannon Mountain and Eagle Cliffs and Mt. Lafayette and Agassiz and Cleveland, while a short way off is Cherry Mountain, The Twins, and the Presidential Range, while natural curiosities like The Basin, The Flume, The Pool, and Echo Lake and Profile Lake are well worth visiting. Then, of course, all who go to the mountains want to visit the wonderland of New England, as that famous mountain pass, Crawford's Notch, is termed. Everything there is in its primeval state, and charming cascades, rushing forest stream and gigantic mountains make it the ideal place for the tourist, as well as the one seeking rest.

There are very many other sections of the White Mountains equally attractive as pleasure resorts, and at any of them you will find excellent accommodations, for the mountain hotels are every one of them models.

Beginning September 10 and continuing until about the 8th of October, the Boston & Maine Railroad will place on sale at many of its leading stations reduced rate tickets to all points in the mountains. The choice of several routes will be allowed, and for information apply to any station ticket office. Send to the General Passenger Department, Boston & Maine Railroad, Boston, for the book "What to See in the White Mountains."

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HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated: correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(7494) C. S. D. asks (1) for a formula for coating the back of a photographic dry plate to avoid halation. A. Powdered burnt sienna is used, mixed with gum and water. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 1030. 2. Will this coating have to be removed before development? (I use Eikonogen developer.) If so, how? A. Yes; with a tuft of cotton or sponge.

(7495) S. M. R. says: Please answer through inquiry column the following: Formula for glue or paste which will adhere firmly, like the adhesive substance on envelopes, at once it is applied. A. Postage stamp mucilage is said to be made as follows: Gum dextrine, 2 parts; water, 4 parts; acetic acid, 1 part. Dis-

solve with the aid of heat and add one part of ninety per cent alcohol.

(7496) J. B. asks: Could you tell me how to make the cement metal sign engravers use to fill in the letters with after they are cut? A. Melt together in a clean iron pot 2 parts each of best asphaltum and gutta percha; stir well together, and then add 1 part of gum shellac in fine powder. It may be used hot and mixed with small vermilion or other pigment, if desired.

(7497) W. D. C. asks: Will water in small lakes, ponds, or large reservoirs evaporate when the humidity is at a high per cent as fast as at a low per cent, the thermometer and wind being equal in both instances? A. The term "humidity," as popularly used, means the relative humidity or degree of humidity, as compared with full saturation of the air with moisture, and not the absolute quantity of water vapor in a cubic foot of air. When the relative humidity is 100 per cent, the air contains all the water vapor it can hold. It can take no more, and water in ponds, etc., or in clothes hung upon a line, where humidity is 100, cannot evaporate at all. Under a high humidity, evaporation is slow; under a low humidity, it is rapid, other conditions being equal. Every housewife knows that on some days water does not boil away out of her kettles, and on other days it disappears rapidly. On the former humidity is high, on the latter it is low and the air is dry.

(7498) C. B. asks: 1. Can same size wire be used to wind motor of SUPPLEMENT, No. 641, for a dynamo, and if the same circuit is used? A. There is no difference in the winding of a machine to use it as a dynamo or as a motor. 2. Will a soft iron solid ring do for the armature? I use cast iron fields. A. You will have about one-half as much power with cast iron as with wrought iron. The design is made for wrought iron.

(7499) F. G. asks whether the direct or alternating current should be used in the electric arc furnace illustrated and described in a late issue of the SUPPLEMENT. A. Either current may be used.

(7500) W. R. A. says: 1. Can you tell me what photographers use to obtain the high gloss which some photos have? It seems to be a thin coating of some kind that is put on over the picture that gives it the appearance of glass. A. Use very clean plates and rather larger than the prints to be enameled. Wipe them well, rub them with talc, and remove the excess with a soft brush passed lightly over the surface. In a dish, half filled with ordinary water, immerse the photographs and allow them to soak. This being done, coat one of the taced plates with enameled collodion in the ordinary way, agitate to cause the ether to evaporate, and when the film has set—that is to say, in a few seconds—steep this plate, the collodionized surface up, in a second dish containing pure water. Now take one of the prints in the first dish and apply the printed side to the collodion, remove the plate from the dish, keeping the print in its place with the finger of the left hand, and remove the air bubbles by lightly rubbing the back of the photograph with the forefinger of the right hand. Care has been taken beforehand to prepare some very pure starch paste, passed through a cloth, and some thin cardboards, or simply thick paper, the size of the plates used. The air bubbles having completely disappeared, and the perfect adherence of the print ascertained, dry with bibulous paper, and spread over the prepared cardboard on paper a coating of the collodion by means of a flat brush. Apply this sheet on the print, pass the finger over it to obtain complete adherence, and give it twenty-four hours to dry. At the expiration of this time, cut with a penknife the cardboard or paper ven with the print, and detach by one corner. If the plate has been well cleaned, the print will come off itself. We get in this manner a very brilliant surface, and as soiled as that obtained by use of gelatine, which, as it is seen, is entirely done away with in this process. The prints are afterward mounted on thick cardboard in the usual way. It is possible, by mixing with the collodion some methyl blue, dissolved in alcohol (a few drops are sufficient), to obtain moonlight effects, especially if a rather strong negative has been used. For sunsets, make use of an alcoholic solution in coccine. Wet gelatine prints are simply rolled down on clean ferrotypes plates which have been previously rubbed over with a cloth having a very minute quantity of beeswax rubbed over it, the beeswax being almost entirely removed from the ferrotypes plates by means of a clean cloth. The prints will come off readily when dry. 2. Also is there such a thing as liquid celluloid, and is it proof against heat and cold—that is, will either of them cause it to crack? I have taken your paper for four years, and think it is the best in the world. A. There is a celluloid varnish called "Roxy-line Enamel," sold by dealers in photographic materials, which is practically liquefied celluloid. Temperature will have little effect on it.

(7501) M. I. M. asks for the composition for birdlime. A. Boil the middle bark of the holly, gathered in June or July, for six or eight hours in water, until it becomes tender; then drain off the water and place it in a pit underground, in layers with fern, and surround it with stones. Leave it to ferment for two or three weeks, until it forms a sort of mucilage, which must be pounded in a mortar, into a mass, and well rubbed between the hands, in running water, until all the refuse is worked out; then place it in an earthen vessel and leave it for four or five days to ferment and purify itself. Remarks: Birdlime may also be made from mistletoe berries, the bark of the wayfaring tree, and other vegetables by a similar process. Should any of it stick to the hands, it may be removed by means of a little oil of lemon bottoms or turpentine. Use.—To rub over twigs to catch birds or small animals. It is said to be discentent when applied externally.

TO INVENTORS.

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

SEPTEMBER 13, 1898,

AND EACH BEARING THAT DATE.

(See note at end of list about copies of these patents.)

Table listing inventions and their patent numbers. Includes items like Abrading material, Aerial ship, Air compressor, etc., with corresponding patent numbers ranging from 610,761 to 610,954.

(Continued on page 206)